OCT 1992

FEM 1.209:361332/485

FLOOD INSURANCE STUDY

TOWN OF AMENIA, NEW YORK
DUTCHESS COUNTY

REVISED
NOVEMBER 15, 1989

Federal Emergency Management Agency

COMMUNITY NUMBER - 361332

HQW

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program (NFIP) have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

Part or all of this FIS may be revised and republished at any time. In addition, part of this FIS may be revised by the Letter of Map Revision (LOMR) process, which does not involve republication or redistribution of the FIS. It is, therefore, the responsibility of the user to consult with community officials and to check the community repository to obtain the most current FIS components.

Initial Flood Insurance Study Effective Date: September 24, 1984

Flood Insurance Study Revised: November 15, 1989

TABLE OF CONTENTS

		Page
1.0	INTRODUCTION	1
	1.1 Purpose of Study	1
	1.2 Authority and Acknowledgments	1
	1.3 Coordination	1
2.0	AREA STUDIED	2
	2.1 Scope of Study	2
	2.2 Community Description	4
	2.3 Principal Flood Problems	5
	2.4 Flood Protection Measures	5
3.0	ENGINEERING METHODS	5
	3.1 Hydrologic Analyses	6
	3.2 Hydraulic Analyses	8
4.0	FLOODPLAIN MANAGEMENT APPLICATIONS	9
	4.1 Floodplain Boundaries	9
	4.2 Floodways	10
5.0	INSURANCE APPLICATIONS	12
6.0	FLOOD INSURANCE RATE MAP	14
7.0	OTHER STUDIES	14
8.0	LOCATION OF DATA	14
9.0	BIBLIOGRAPHY AND REFERENCES	15

TABLE OF CONTENTS - continued

Page

FIGURES

Figure 1 - Vicinity Map 3

Figure 2 - Floodway Schematic 12

TABLES

Table 1 - Summary of Discharges 7 - 8

Table 2 - Floodway Data 11

EXHIBITS

Exhibit 1 - Flood Profiles
Wassaic Creek Panels 01P-02P
Webatuck Creek Panels 03P-10P
Amenia Stream Panels 11P-15P
Tributary to Amenia Stream Panels 16P-17P

Exhibit 2 - Flood Insurance Rate Map Index and Street Index
Flood Insurance Rate Map

Exhibit 3 - Elevation Reference Marks

FLOOD INSURANCE STUDY
TOWN OF AMENIA, DUTCHESS COUNTY, NEW YORK

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study revises and updates a previous Flood Insurance Study/Flood Insurance Rate Map for the Town of Amenia, Dutchess County, New York. This information will be used by the Town of Amenia to update existing floodplain regulations as part of the Regular Phase of the National Flood Insurance Program (NFIP). The information will also be used by local and regional planners to further promote sound land use and floodplain development.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were prepared by Edwards and Kelcey Engineers, Inc., for the Federal Emergency Management Agency (FEMA), under Contract No. EMW-85-C-1887. This work was completed in November 1987.

1.3 Coordination

On September 18, 1984, an initial Consultation and Coordination Officer's (CCO) meeting was held with representatives of FEMA, the town, and Edwards and Kelcey Engineers, Inc., (the study contractor) to identify the streams to be studied by detailed methods.

During the coarse of the study, a search for basic data was made at all levels of government. The U. S. Geological Survey (USGS) was contacted and provided information on USGS water-surface data.

An interim CCO meeting was held on November 4, 1987 with town officials to obtain additional local input.

On October 20, 1988, a final CCO meeting was held with representatives of FEMA, the town, and the study contractor to review the results of the study.

2.0 AREA STUDIED

2.1 Scope of Study

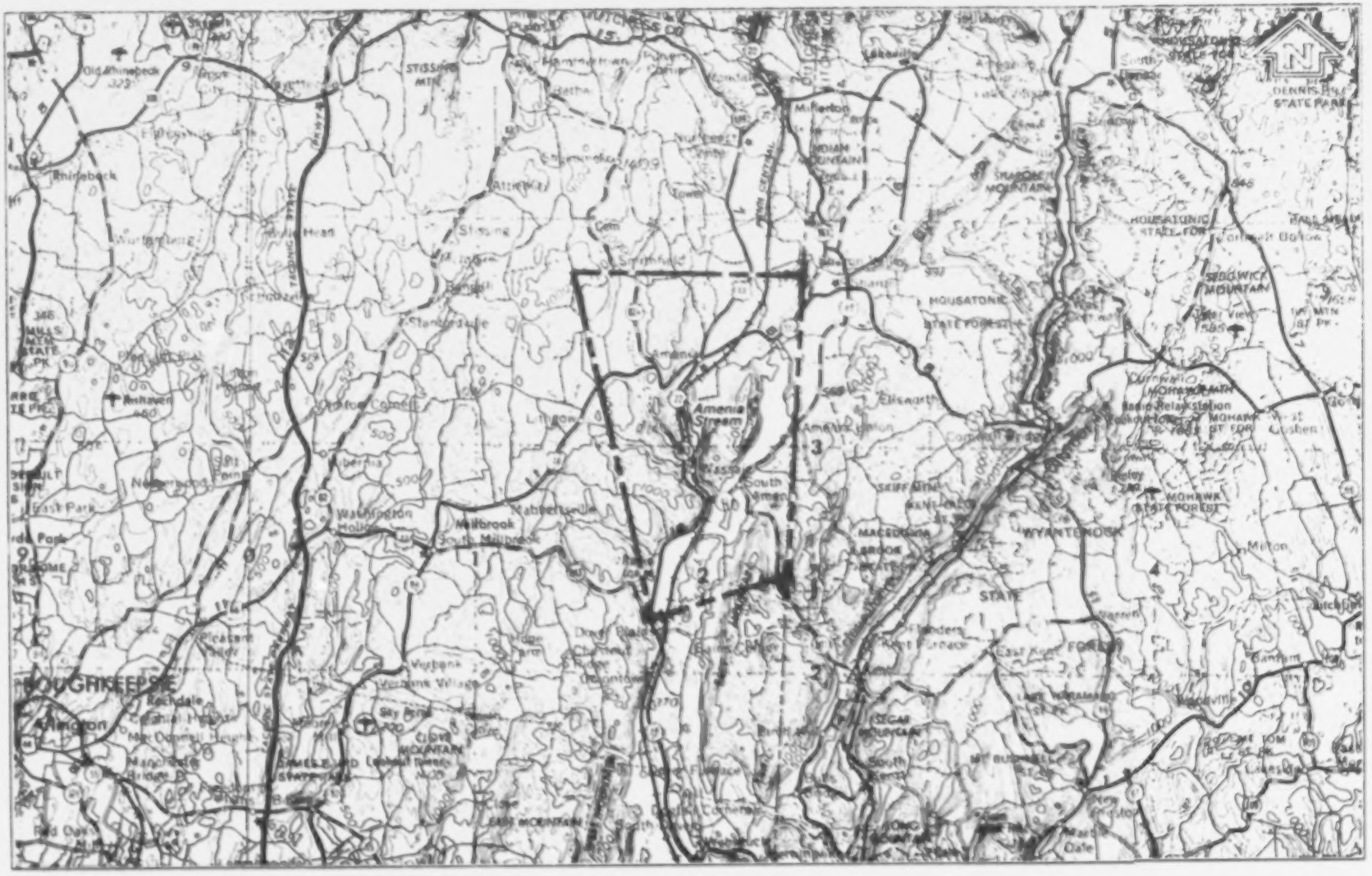
This Flood Insurance Study covers the incorporated area of the Town of Amenia, Dutchess County, New York. The area of study is shown on the Vicinity Map (Figure 1).

The streams studied by detailed methods are shown in the following tabulation:

Stream	Limits of Detailed Study
Wassaic Creek	from a point approximately 950 feet upstream of its confluence with the Tenmile River to its confluence of Amenia Stream;
Webatuck Creek	from a point approximately 700 feet upstream of its confluence with the Tenmile River to a point approximately 3.4 miles upstream of County Route 3 and from a point approximately 2 miles downstream of County Route 2 (Leedsville Road) to a point approximately 60 feet downstream of County Route 2;
Amenia Stream	from its confluence with Wassaic Creek to a point approximately 860 feet upstream of upstream crossing of State Route 343; and
Tributary to Amenia Stream	from its confluence with Amenia Stream to a point approximately 910 feet above upstream end of State Route 343 culvert.

The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction through November 1992.

The Tenmile River and portions of Webatuck Creek were studied by approximate methods. Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon by, FEMA and the Town of Amenia.


Amenia Stream
Millbrook
Rhinebeck
Ancram
Millerton
Wyantenock
Poughkeepsie
Arlington
Hyde Park
Staatsburg
Milton
Sedgwick Mountain
Dennis Hill State Park
Taconic State Park
Housatonic State Forest
Mohawk State Forest
Clove Mountain
Stissing Mtn
Indian Mountain
Schunemunk Mountain
Macedonia Brook State Park
Sky Farm
Lake Walton
Lake Oniontown
Long Pond
Lake Noonamuck
Lake Wonderwell
Lake Lonesome
Lake Sharon
Lake Ellsworth
Lake Amenia
Lake Mabbettsville
Lake Washington
Lake Millbrook
Lake Stissing
Lake Mary
Lake Tamarack
Lake Mahopac
Lake Gleneida
Lake Carmel
Lake Peekskill
Lake Kitchawan
Lake Waccabuc
Lake Truesdale
Lake Rippowam
Lake Waramaug
Lake Lillinonah
Lake Zoar
Lake Quassapaug
Lake Housatonic
Lake Waramaug
Lake Candlewood

2.2 Community Description

The Town of Amenia is located in southeastern New York, in the northeastern portion of Dutchess County, approximately 75 miles north of New York City. It is bordered by the Town of Northeast to the north; the Towns of Kent and Sharon, Connecticut, to the east; the Town of Dover to the south; and the Towns of Stanford and Washington to the west. The total land area within Amenia is approximately 41.1 square miles.

The 1980 population of Amenia was 7,993, a decrease of 1,006 from the 1970 population of 8,999, and an increase of 447 over the 1960 population of 7,546 (Reference 1).

Approximately 34 percent of the town is devoted to agriculture, 5 percent is residential, 6 percent is commercial/industrial and recreational, and the remaining area vacant or woodland (Reference 2). The majority of the development has occurred in the vicinity of the intersection of State Route 22, State Route 343, and U. S. Route 44, and in the vicinity of the confluence of Amenia Stream and the Wassaic Creek. Within the floodplains studied, development consists primarily of single-family residences with a limited amount of commercial development.

Wassaic Creek originates in the Town of Northeast, approximately 3 miles north of Amenia, and flows in a southeastern direction. It has a drainage area of 37.3 square miles at the upstream boundary of the Wassaic State School.

Webatuck Creek originates in the Town of Salisbury, Connecticut, approximately 11 miles north of Amenia, and flows in a southern direction. It has a drainage area of 80.8 square acres at the upstream boundary of the Wassaic State School.

Amenia Stream and Tributary to Amenia Stream originate in the Town of Northeast, approximately 1 mile north of Amenia, and flow in a southern direction. Amenia Stream has a drainage area of 11.2 square miles at its confluence with Wassaic Creek, approximately 350 feet downstream of Main Street Tributary to Amenia Stream has a drainage area of 2.5 square miles at its confluence with Amenia Stream approximately 850 feet downstream of the State Route 343 bridge.

The climate of the area is characterized as humid continental. Summer and winter temperatures range from 74.7 degrees Fahrenheit (^{o}F) to 26.2^{o}F, respectively. The average annual precipitation is 38 inches, with a recorded annual snowfall of 42.2 inches. The precipitation is fairly evenly distributed throughout the year (Reference 3).

2.3 Principal Flood Problems

Historical flooding records indicate that flooding can occur in Amenia during any season of the year. During the 1900's, Amenia has experienced several floods. Notable floods within the town occurred in May 1984 and August 1955.

The 1984 flood impacted the upper reach of the Tenmile River Basin, resulting in extensive damage to commercial and residential areas of the town (Reference 4). Flooding along Amenia Stream was also experience during the 1984 event, including partial inundation of Church Street, Main Street, and State Route 343, and forced the evacuation and closing of Calsi's Market.

The August 1955 flood damage included a failed dam at Lake Amenia and the closure of five bridges and State Route 343 (Reference 5).

Two USGS gaging stations are located in the area of Amenia. Gage No. 01199400 is located on Webatuck Creek in south Amenia; and gage No. 1199420 is located on the Tenmile River in the Town of Dover.

2.4 Flood Protection Measures

There are no flood protection facilities along any of the studied streams within the Town of Amenia and none are currently planned.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1 percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each flooding source studied in detail affecting the community.

The hydrologic analyses for Wassaic Creek, Amenia Stream, and Tributary to Amenia Stream followed a procedure presented in Water Resources Investigations 79-93, Techniques for Estimating the Magnitude and Frequency of Floods on Rural Unregulated Streams in New York State Excluding Long Island (Reference 6). This procedure relates drainage area and storage percent to a series of regression equations for the southeastern region. Discharges were computed for specific recurrence intervals by substituting the applicable values into the corresponding regression equations.

Discharges for Webatuck Creek were determined from the two separate log-Pearson Type III distributions for gaged streams published in the Flood Insurance Studies for the Towns of Dover and Northeast (References 7 and 8).

Peak discharges for the selected recurrence intervals at USGS stream gage No. 01199420, located on the Tenmile River in the Town of Dover, and the transfer coefficients to be applied when transferring discharges upstream to USGS gage No. 01199400, were derived from the Flood Insurance Study for the Town of Dover (Reference 7). The transfer coefficients to be applied when transferring discharges upstream from USGS stream gage No. 01199400, located on the Webatuck Creek in south Amenia were derived from the Flood Insurance Study for the Town of Northeast (Reference 8). The above analyses conform with the techniques described in the USGS Bulletin 17B and Water Resources Investigations 79-83 (References 9 and 6).

The peak discharges were determined by the following transfer equation:

$$Q_2/Q_1 = (DA_2/DA_1)^x$$

where Q_1 is the peak discharge at a known location, DA_1 is the drainage area at a known location, Q_2 is the peak discharge at desired location, DA_2 is the drainage area at desired location, and x is the transfer coefficient.

The recurrence intervals and corresponding transfer coefficients used in the transfer equation are presented in the following tabulation:

Information Source	Recurrence Interval (years)	Transfer Coefficient
Flood Insurance Study for the Town of Dover	10	1.03
	50	1.25
	100	1.29
	500	1.48
Flood Insurance Study for the Town of Northeast	10	0.67
	50	0.67
	100	0.67
	500	0.67

The peak discharges for the selected recurrence intervals on the Tenmile River at the Amenia-Dover corporate limits were obtained from the Flood Insurance Study of Dover (Reference 7). The discharges were transferred from the Amenia-Dover corporate limits to USGS stream gage No. 1199400, located on Webatuck Creek, applying the data from the Dover study to the transfer equation. Peak discharges at locations upstream of the gage were determined by using the transfer coefficients from the Flood Insurance Study for the Town of Northeast (Reference 8).

A summary of the drainage area-peak discharge relationships for the streams studied by detailed methods is shown in Table 1, "Summary of Discharges."

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
WASSAIC CREEK					
At Wassaic State School boundary	37.3	2,018	3,340	4,040	*
WEBATUCK CREEK					
At a point approximately 670 feet upstream of confluence with the Tenmile River	80.0	2,808	4,139	4,912	*
Immediately upstream of County Route 3	74.8	2,667	3,931	4,666	*
At a point approximately 2.0 miles downstream of County Route 2	57.6	2,238	3,298	3,915	*

*Data not available

TABLE 1 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
AMENIA STREAM					
Immediately upstream of confluence with Wassaic Creek	11.2	601	975	1,166	*
Immediately downstream of Lake Road	7.7	525	866	1,041	
Immediately upstream of confluence of Tributary to Amenia Stream	3.3	206	333	396	*
TRIBUTARY TO AMENIA STREAM					
Immediately upstream of confluence with Amenia Stream	2.5	179	292	349	*

*Data not available

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

Cross sections for the backwater analyses of the streams studied by detailed methods were obtained from aerial photographs at a scale of 1:7,200 (Reference 10). Below-water sections were obtained by field measurement. All bridges, dams, and culverts were field surveyed to obtain elevation data and structural geometry.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross-section locations are also shown on the Flood Insurance Rate Map (Exhibit 2).

Water-surface elevations of floods of the selected recurrence intervals were computed using the COE HEC-2 step-backwater computer program (Reference 11). The computer model was calibrated using historic floodwater marks from the flood of May 1984. Flood profiles were drawn showing computed water-surface elevations for floods of the selected recurrence intervals. Starting water-surface elevations for the streams studied by detailed methods were calculated using the slope/area method.

Roughness coefficients (Manning's "n") used in the hydraulic computations were determined on the basis of field observations of the channel and floodplain areas, and engineering judgment. Large "n" values, typically greater than 0.100, were used for areas of ineffective flow. The channel "n" and overbank "n" values for the streams studied by detailed methods are shown in the following tabulation:

Stream	Channel "n"	Overbank "n"
Wassaic Creek	0.040	0.060 - 0.090
Webatuck Creek	0.015 - 0.060	0.015 - 0.090
Amenia Stream	0.029 - 0.050	0.030 - 0.100
Tributary to Amenia Stream	0.029 - 0.050	0.050 - 0.100

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in this study are shown on the maps; the descriptions of the marks are presented in Elevation Reference Marks (Exhibit 3).

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year floodplain boundaries and 100-year floodway to assist in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2 percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For the streams studied in detail, the 100- and 500-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:4,800 with a contour interval of 4 feet (Reference 12).

For the streams studied by approximate methods, the 100-year floodplain boundaries were delineated using topographic maps at a scale of 1:24,000 with a contour interval of 10 feet, and the previous Flood Insurance Study for the Town Amenia (References 13 and 14).

The 100- and 500-year floodplain boundaries are shown on the Flood Insurance Rate Map (Exhibit 2). On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A and AE), and the 500-year floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 100- and 500-year floodplain boundaries are close together, only the 100-year floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by approximate methods, only the 100-year floodplain boundary is shown on the Flood Insurance Rate Map (Exhibit 2).

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as a minimum standard that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways presented in this study was computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections (Table 2). The computed floodway is shown on the Flood Insurance Rate Map (Exhibit 2). In cases where the floodway and 100-year floodplain boundaries are either close together or collinear, only the floodway boundary is shown.

The area between the floodway and 100-year floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Wassaic Creek								
A	3,590[1]	617	2,131	1.9	421.4	421.4	422.3	0.9
B	7,990[1]	97	643	6.3	433.2	433.2	433.9	0.7
Webatuck Creek								
A	2,432[1]	211	1,638	3.0	424.7	424.7	425.4	0.7
B	5,708[1]	729	4,797	1.0	426.3	426.3	427.1	0.8
C	8,675[1]	360	2,199	2.2	432.7	432.7	432.8	0.1
D	12,380[1]	460	3,583	1.4	440.3	440.3	440.7	0.4
E	19,180[1]	148	1,230	3.8	442.8	442.8	443.0	0.2
F	25,850[1]	778	3,872	1.2	444.4	444.4	445.0	0.6
G	32,257[1]	233	1,019	4.6	447.2	447.2	447.7	0.5
H	45,035[1]	64	518	7.6	461.5	461.5	462.5	1.0
I	48,749[1]	170	965	4.1	470.0	470.0	470.4	0.4
J	53,768[1]	340	1,278	3.1	481.3	481.3	482.1	0.8
Amenia Stream								
A	792[2]	100	384	3.0	456.3	456.3	456.9	0.6
B	11,121[2]	214	643	1.8	473.1	473.1	473.6	0.5
C	16,351[2]	180	455	2.6	495.6	495.6	495.8	0.2
D	23,430[2]	100	429	2.4	542.1	542.1	542.4	0.3
E	28,682[2]	630	815	0.5	549.2	549.2	549.5	0.3
Tributary to Amenia Stream								
A	1,836[3]	286	186	1.9	549.6	549.6	549.9	0.3

[1] Feet above confluence with Tenmile River
[2] Feet above confluence with Wassaic Creek
[3] Feet above confluence with Amenia Stream

TABLE 2

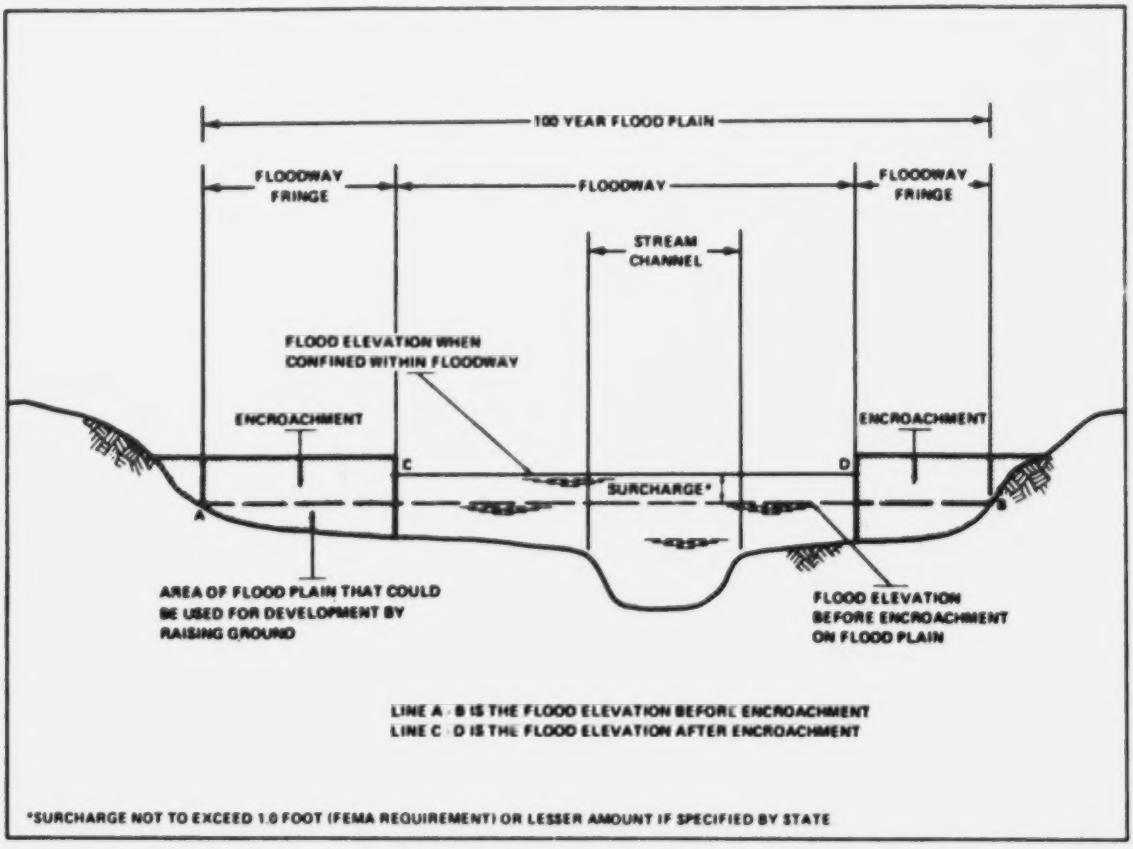
FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF AMENIA, NY
(DUTCHESS CO.)

FLOODWAY DATA

WASSAIC CREEK—WEBATUCK CREEK—AMENIA STREAM—TRIBUTARY TO AMENIA STREAM

by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 2.


100 YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE A - B IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE C - D IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE

FLOODWAY SCHEMATIC Figure 2

5.0 INSURANCE APPLICATIONS

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. The zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. In most instances, whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AH

Zone AH is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AO

Zone AO is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-depths derived from the detailed hydraulic analyses are shown within this zone.

Zone A99

Zone A99 is the flood insurance rate zone that corresponds to areas of the 100-year floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or depths are shown within this zone.

Zone V

Zone V is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Because approximate hydraulic analyses are performed for such areas, no base flood elevations are shown within this zone.

Zone VE

Zone VE is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year floodplain, areas within the 500-year floodplain, and to areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

Zone D

Zone D is the flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols, the 100- and 500-year floodplains. Floodways and the locations of selected cross sections used in the hydraulic analyses and floodway computations are shown where applicable.

7.0 OTHER STUDIES

Flood Insurance Studies have been prepared for the Towns of Dover and Northeast (References 7 and 8). The results of this study are in complete agreement with the results of those studies.

Due to its more detailed nature, this study supersedes the previous Flood Insurance Study for the Town of Amenia (Reference 14).

8.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting FEMA, the Natural and Technological Hazards Division, 26 Federal Plaza, Room 1351, New York, New York 10278.

0 BIBLIOGRAPHY AND REFERENCES

1. U. S. Department of Commerce, Bureau of the Census, 1980 Census of Population, Volume 1, Characteristics of the Population, Chapter A, Number of Inhabitants, Part 34, New York, Washington, D. C., U. S. Government Printing Office, February 1982.

2. Dutchess County, Department of Planning, Existing Land Uses in Acres by Municipality, Poughkeepsie, New York, 1976.

3. U. S. Department of Commerce, National Oceanic and Atmospheric Administration, National Climatic Center, Climatography of the United States, No. 60, Climate of New York State 1951-1970, Asheville, North Carolina, 1972.

4. The Harlem Times, Amenia, New York, 132nd Year, No. 23, June 7, 1984.

5. The Harlem Times, Amenia, New York, 103rd Year, No. 34, August 5, 1955.

6. U. S. Department of the Interior, Geological Survey, Water Resources Investigations 79-83, Techniques for Estimating the Magnitude and Frequency of Floods on Rural Unregulated Streams in New York State Excluding Long Island, Albany, New York, July 1979.

7. Federal Emergency Management Agency, Flood Insurance Study, Town of Dover, Dutchess County, New York, Washington, D. C., August 15, 1984.

8. Federal Emergency Management Agency, Flood Insurance Study, Town of Northeast, Dutchess County, New York, Washington, D. C., September 5, 1984.

9. U. S. Department of the Interior, Geological Survey, Office of Water Data Collection, Interagency Advisory Committee on Water Data, "Guidelines for Determining Flood Flow Frequency," Bulletin 17B, Reston, Virginia, Revised September 1981.

10. Quinn and Associates, Inc., of Horsham, Pennsylvania, Aerial Photographs, Scale 1:7,200: Amenia, New York.

11. U. S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water Surface Profiles, Generalized Computer Program, Davis, California, April 1984.

12. Quinn and Associates, Inc., of Horsham, Pennsylvania, Topographic Maps, Scale 1:4,800, Contour Interval 4 Feet: Amenia, New York.

13. U. S. Department of the Interior, Geological Survey, 7.5-Minute Series Topographic Maps, Scale 1:24,000, Contour Interval 10 Feet: Amenia, New York-Connecticut, 1958, Photorevised 1984; Millerton, New York-Connecticut, 1955.

14. Federal Emergency Management Agency, Flood Insurance Study, Town of Amenia, Dutchess County, New York, Washington, D. C., September 24, 1984.

Ernest F. Brater and Horace Williams King, Handbook of Hydraulics, Sixth Edition, New York, McGraw-Hill, 1976.

Ven Te Chow, Open-Channel Hydraulics, New York, McGraw-Hill, 1959.

New York State Department of Transportation, Transportation/Planning Map, Scale 1:250,000, 1974.

U. S. Army Corps of Engineers, Hydrologic Engineering Center, Application of the HEC-2 Bridge Routines, Training Document No. 6, Davis, California, June 1974.

Hagstrom Map Company, Map of Dutchess County, New York, Scale 1:24,000, 1984.

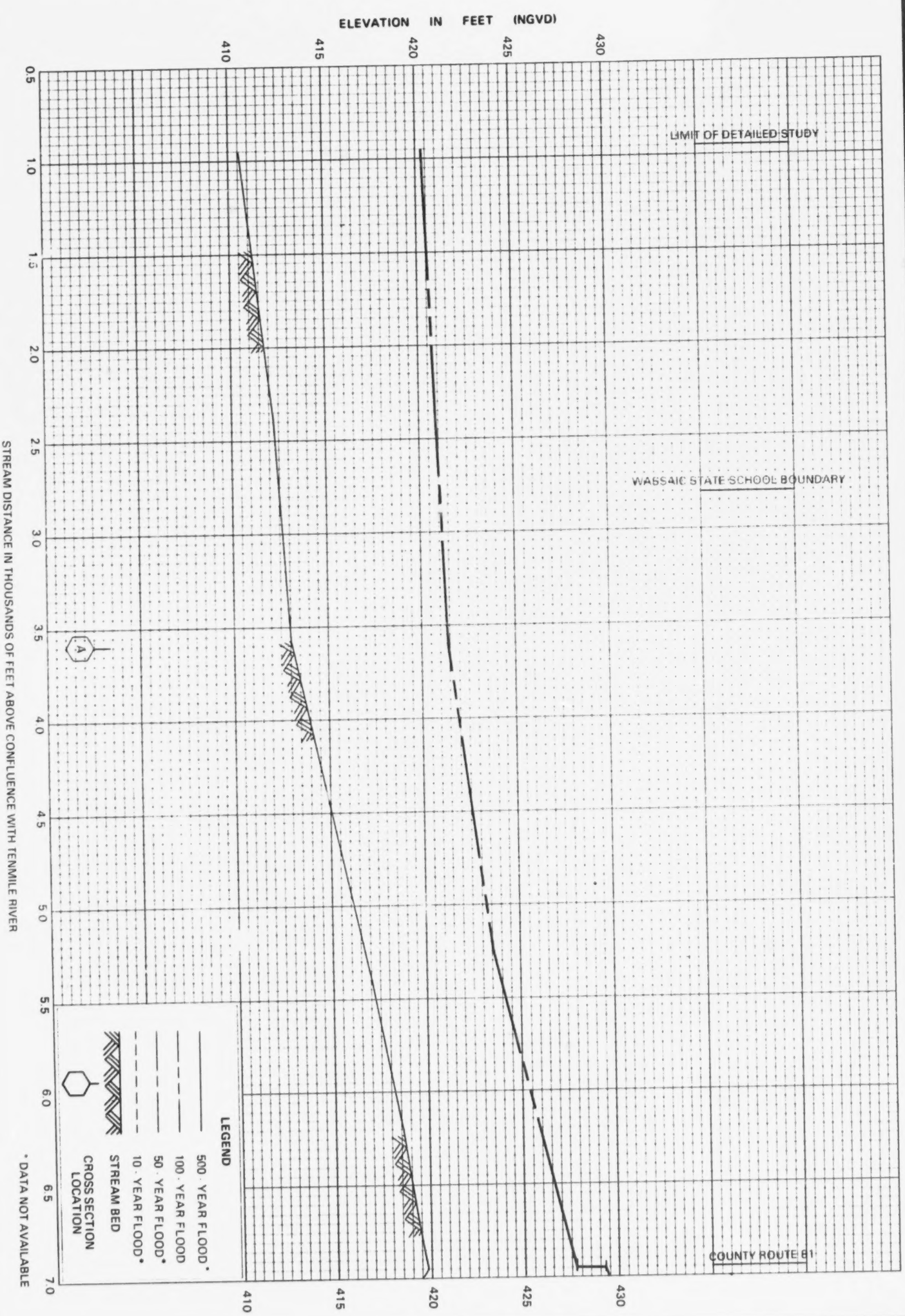
EXHIBIT 3 - ELEVATION REFERENCE MARKS

Reference Mark	FIRM Panel	Elevation (Feet NGVD)	Description of Location
RM 1	06	545.51	Square cut on downstream right bank (facing downstream) abutment of State Route 343 culvert over Tributary to Amenia Stream, approximately 100 feet west of intersection of State Route 343 and Mechanic Depot Road.
RM 2	06	548.76	Square cut on upstream right bank abutment of State Route 343 bridge over Amenia Stream, approximately 1,400 feet southwest of intersection of State Route 343 and Mygatt Road.
RM 3	06	546.36	Square cut on downstream left bank abutment of Mechanic Depot Road bridge over Amenia Stream.
RM 4	06	541.04	Square cut on downstream right bank abutment of Church Street bridge over Amenia Stream.
RM 5	06	540.37	Square cut on upstream right bank abutment of East Broadway Street bridge over Amenia Stream.
RM 6	06	542.36	Square cut on upstream left bank abutment of State Route 22/343 bridge over Amenia Stream.
RM 7	06	537.18	Square cut on downstream right bank abutment of Lake Amenia Road bridge over Amenia Stream at Y-intersection, approximately 75 feet west of bridge center.
RM 8	07	466.73	Square cut on downstream right bank of Amenia Sand and Gravel company bridge, approximately 6 inches lower than bridge deck.
RM 9	09	454.11	Square cut on downstream right bank headwall of downstream Main Street bridge over Amenia Stream.
RM 10	12	447.10	Square cut on upstream right bank abutment of CONRAIL bridge over Wassaic Creek, located approximately 2,000 feet north along County Route 81 from its intersection with Benson Hill Road, and approximately 80 feet southwest of road.

EXHIBIT 3 - ELEVATION REFERENCE MARKS - continued

Reference Mark	FIRM Panel	Elevation (Feet NGVD)	Description of Location
RM 11	12	429.17	Square cut on upstream left bank of County Route 81 bridge over Wassaic Creek.
RM 12	12	445.52	Square cut on upstream right bank wing wall of County Route 3 bridge over Webatuck Creek.

135365



FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF AMENIA, NY
(DUTCHESS COUNTY)

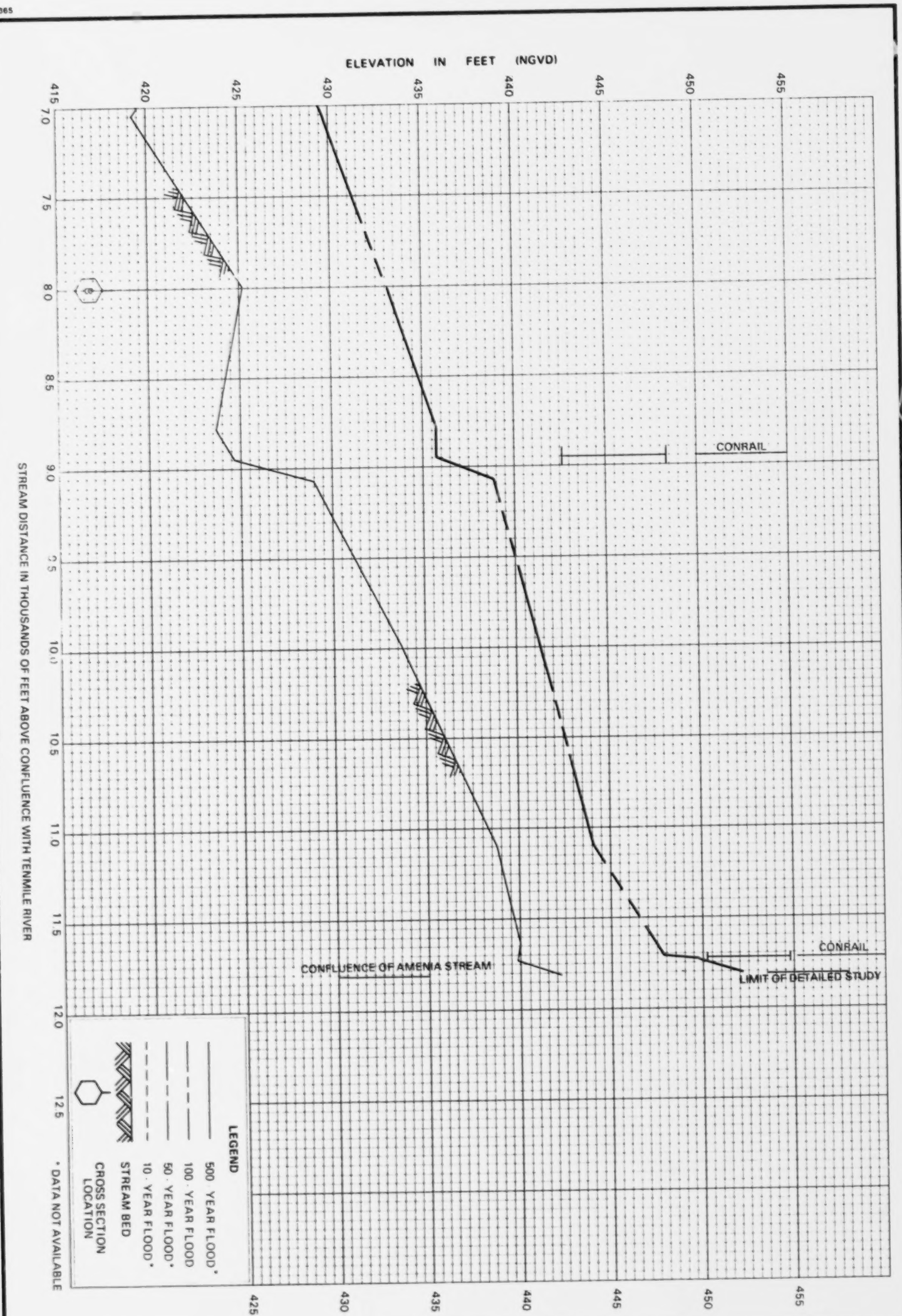
FLOOD PROFILES

WASSAIC CREEK

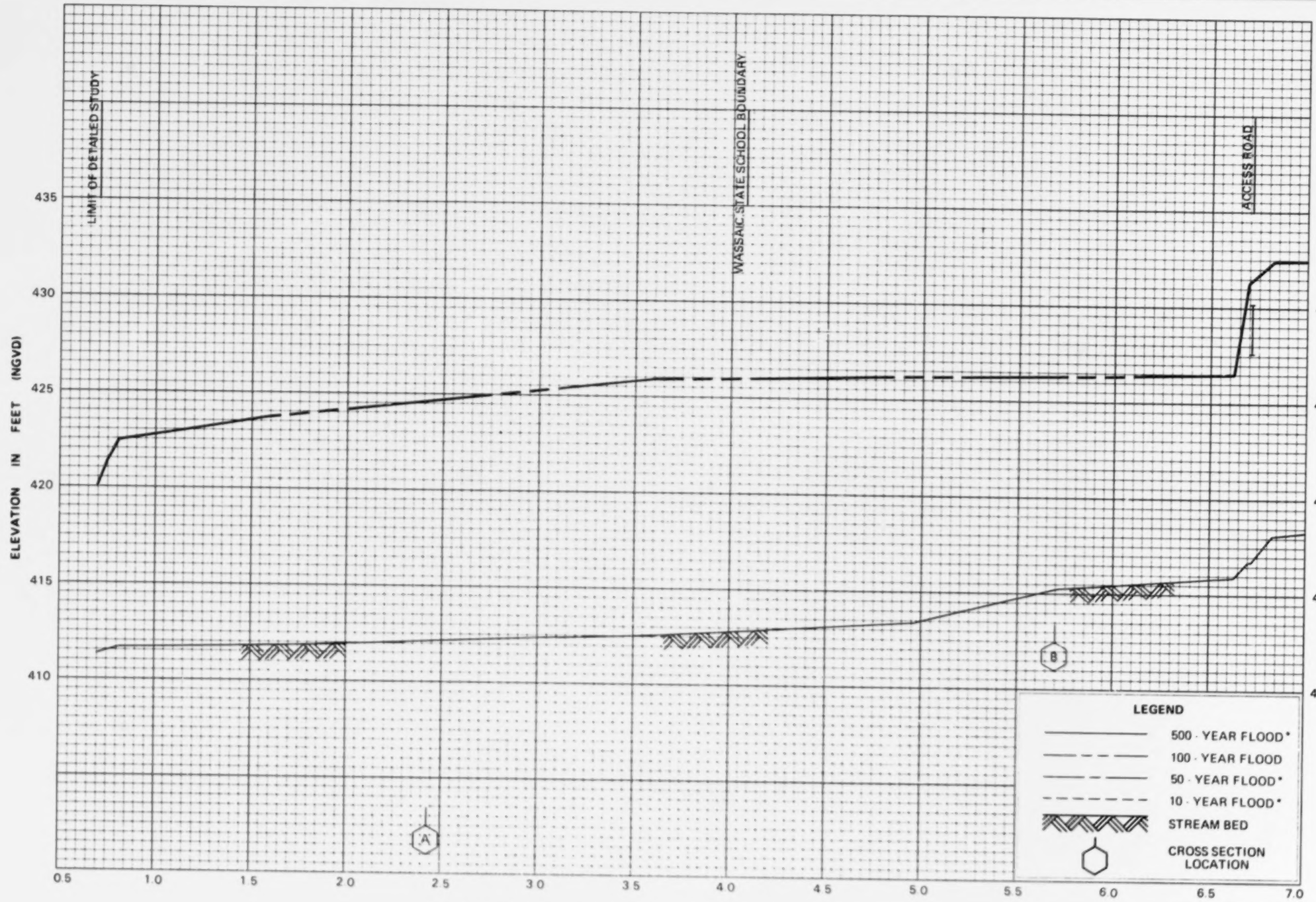
01P

135365

A.R.F. INC. BALTIMORE



02P	FEDERAL EMERGENCY MANAGEMENT AGENCY **TOWN OF AMENIA, NY** (DUTCHESS COUNTY)	**FLOOD PROFILES** **WASSAIC CREEK**



FLOOD PROFILES

WEBATUCK CREEK

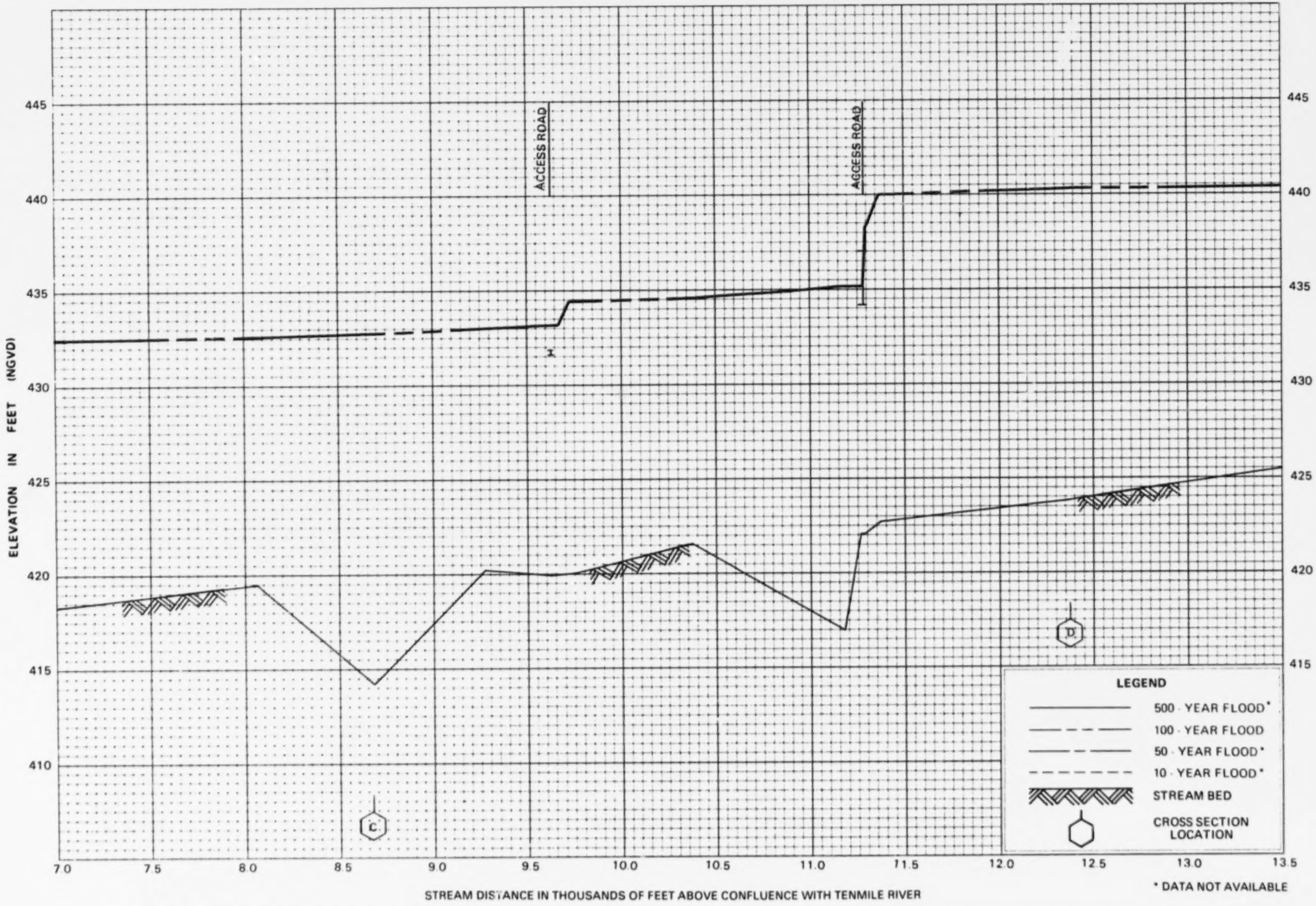
FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF AMENIA, NY
(DUTCHESS COUNTY)

03P

135365

A & E INC. BALTIMORE



FLOOD PROFILES

WEBATUCK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF AMENIA, NY

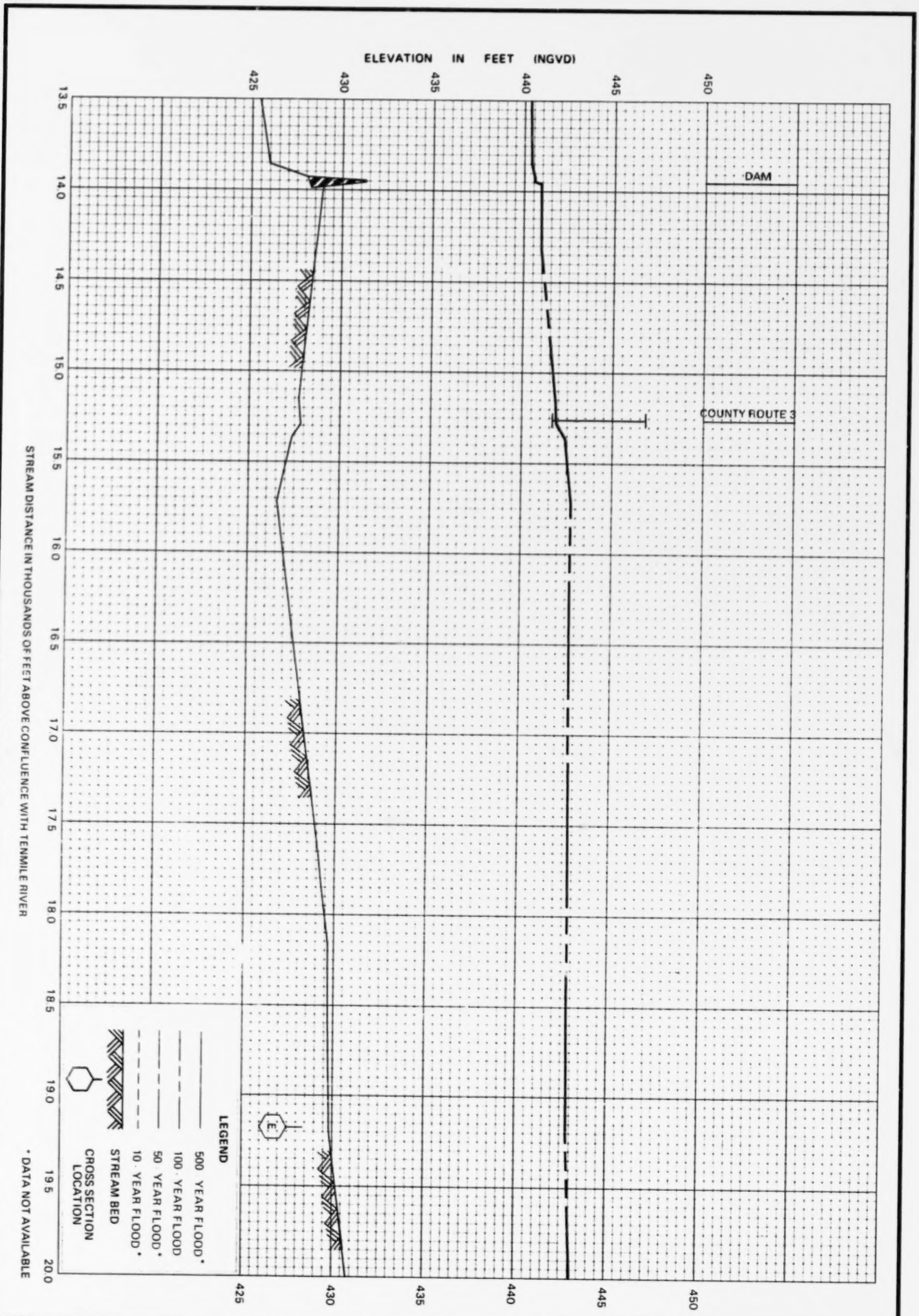
(DUTCHESS COUNTY)

04P

135365

A & E INC. BALTIMORE

135365



23

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF AMENIA, NY
(DUTCHESS COUNTY)

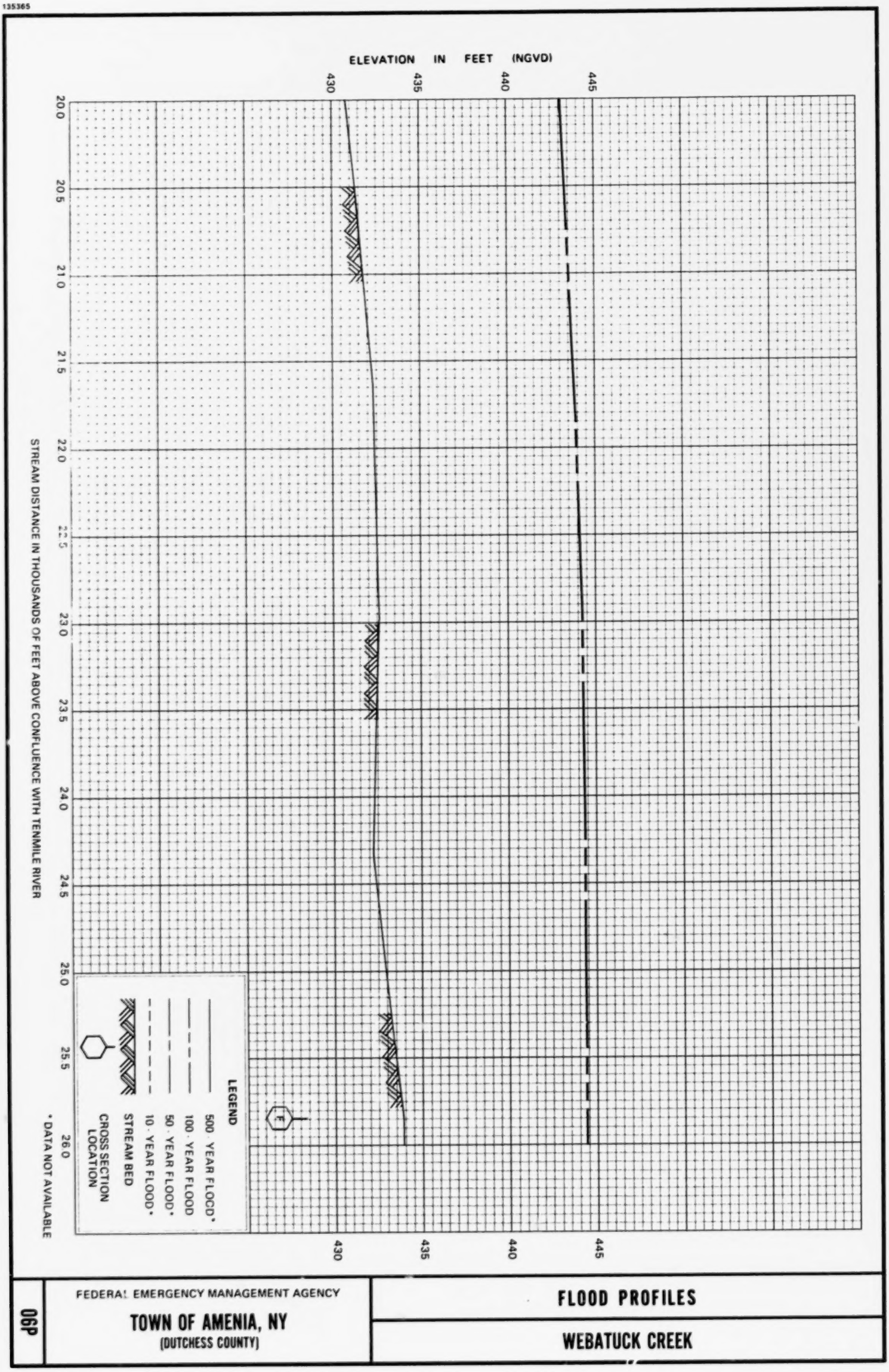
FLOOD PROFILES

WEBATUCK CREEK

05P

135365

A A E INC BALTIMORE



06P

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF AMENIA, NY
(DUTCHESS COUNTY)

FLOOD PROFILES

WEBATUCK CREEK

FLOOD PROFILES

WEBATUCK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF AMENIA, NY

(DUTCHESS COUNTY)

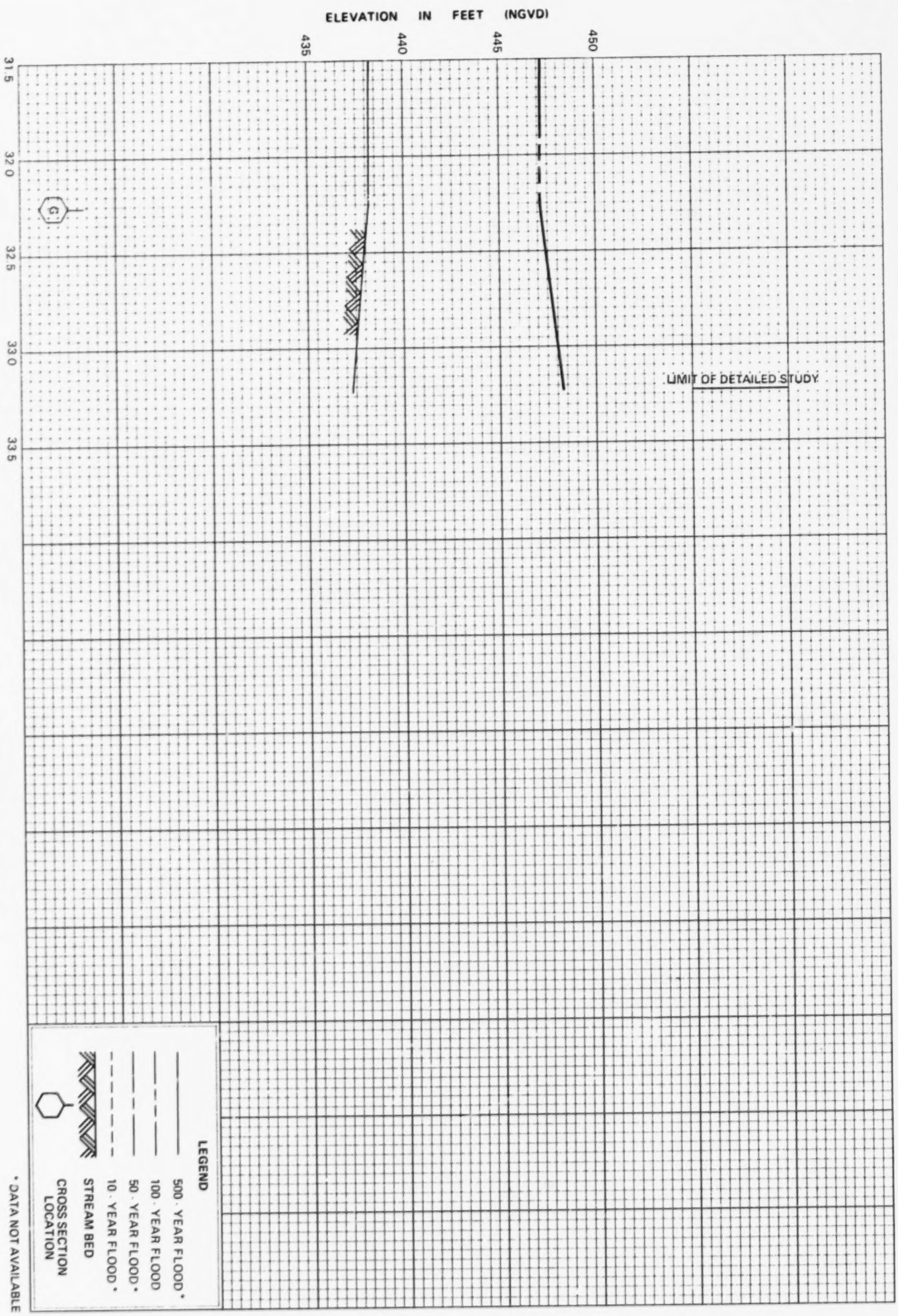
07P

135365

A & E INC. BALTIMORE

135365

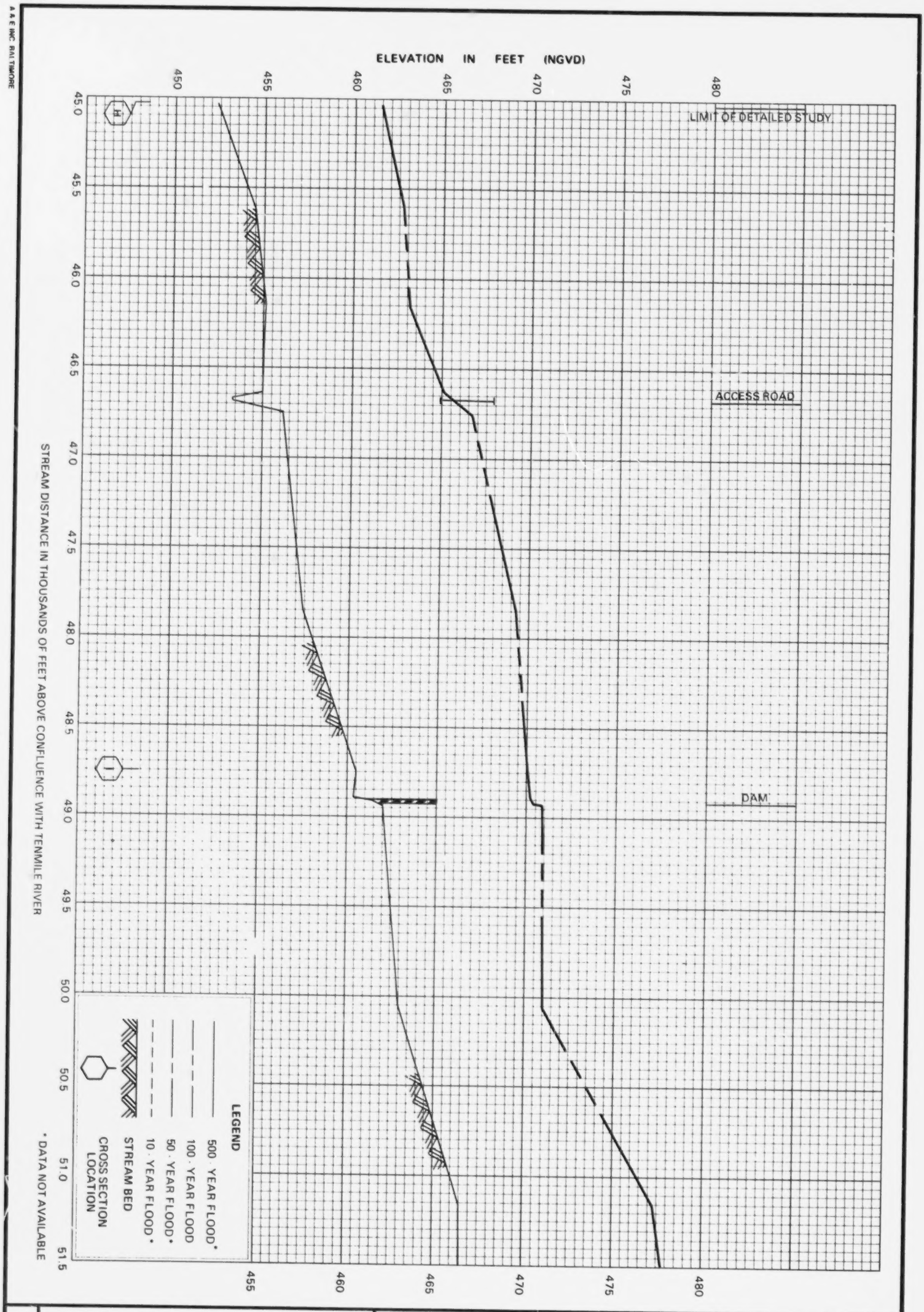
A & E INC. BALTIMORE



08P	FEDERAL EMERGENCY MANAGEMENT AGENCY **TOWN OF AMENIA, NY** (DUTCHESS COUNTY)	**FLOOD PROFILES** **WEBATUCK CREEK**

135365

A A E INC. BALTIMORE



27

FEDERAL EMERGENCY MANAGEMENT AGENCY

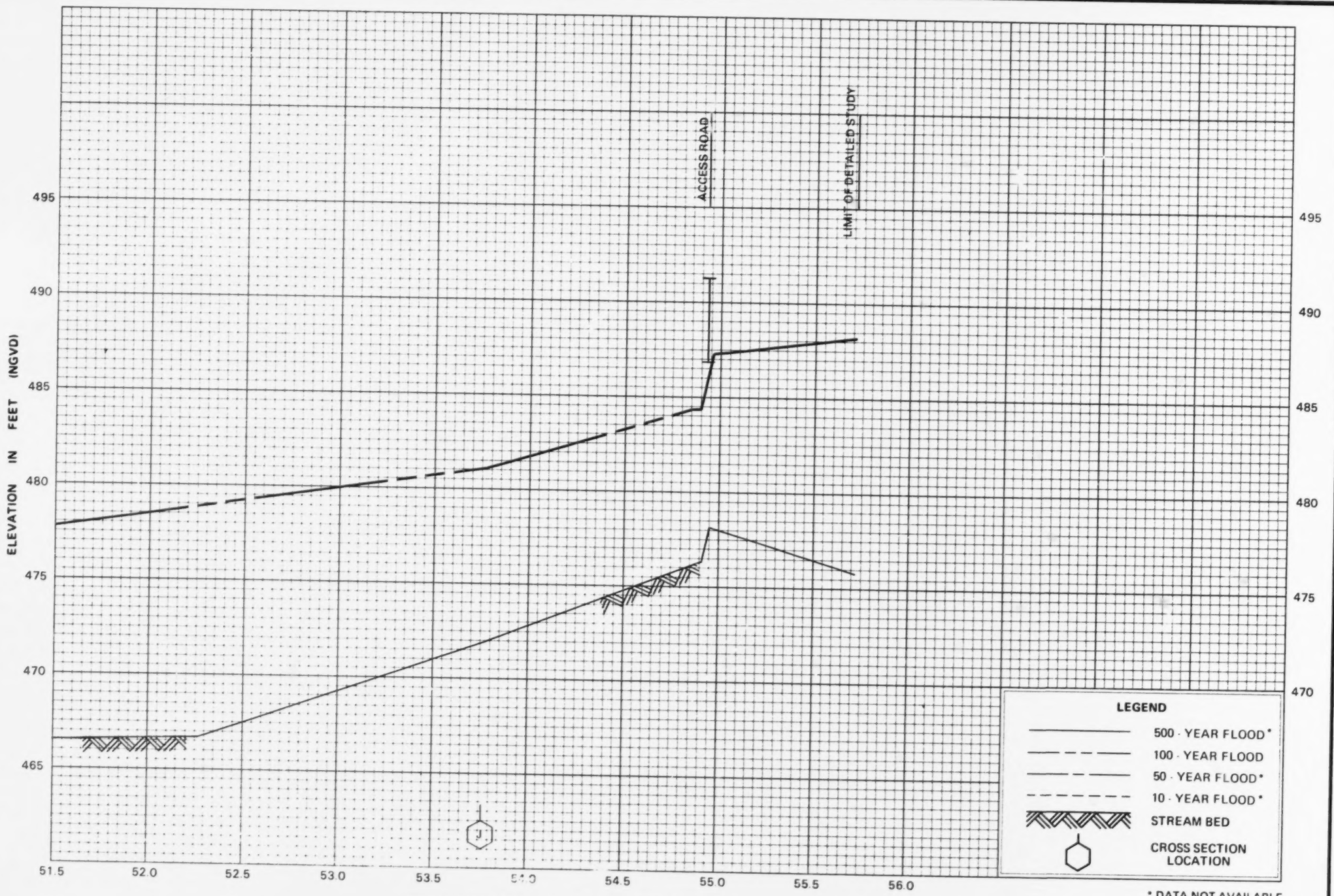
TOWN OF AMENIA, NY

(DUTCHESS COUNTY)

FLOOD PROFILES

WEBATUCK CREEK

09P



FLOOD PROFILES

WEBATUCK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF AMENIA, NY

(DUTCHESS COUNTY)

10P

135365

A & E INC. BALTIMORE

BACKWATER FROM WASSAIC CREEK

CONFLUENCE WITH WASSAIC CREEK

MAIN STREET

ACCESS ROAD

ACCESS ROAD

ACCESS ROAD

CONRAIL

CULVERT

BUILDING

A

ELEVATION IN FEET (NGVD)

475
470
465
460
455
450
445
440

0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5

STREAM DISTANCE IN THOUSANDS OF FEET ABOVE CONFLUENCE WITH WASSAIC CREEK

LEGEND

- 500 - YEAR FLOOD*
- 100 - YEAR FLOOD
- 50 - YEAR FLOOD*
- 10 - YEAR FLOOD*
- STREAM BED
- CROSS SECTION LOCATION

* DATA NOT AVAILABLE

FLOOD PROFILES

AMENIA STREAM

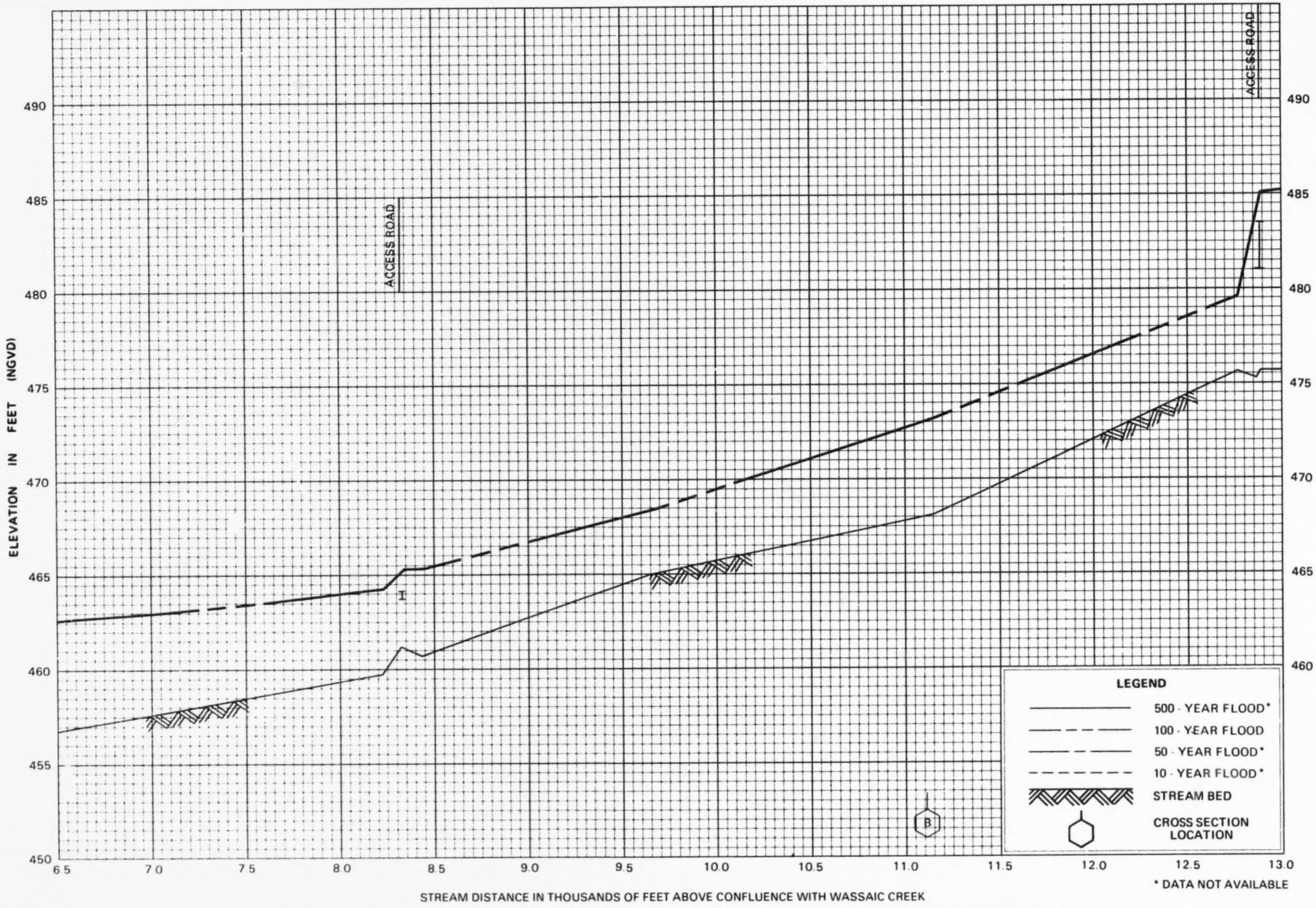
FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF AMENIA, NY
(DUTCHESS COUNTY)

11P

135385

A & E INC. BALTIMORE



FLOOD PROFILES

AMENIA STREAM

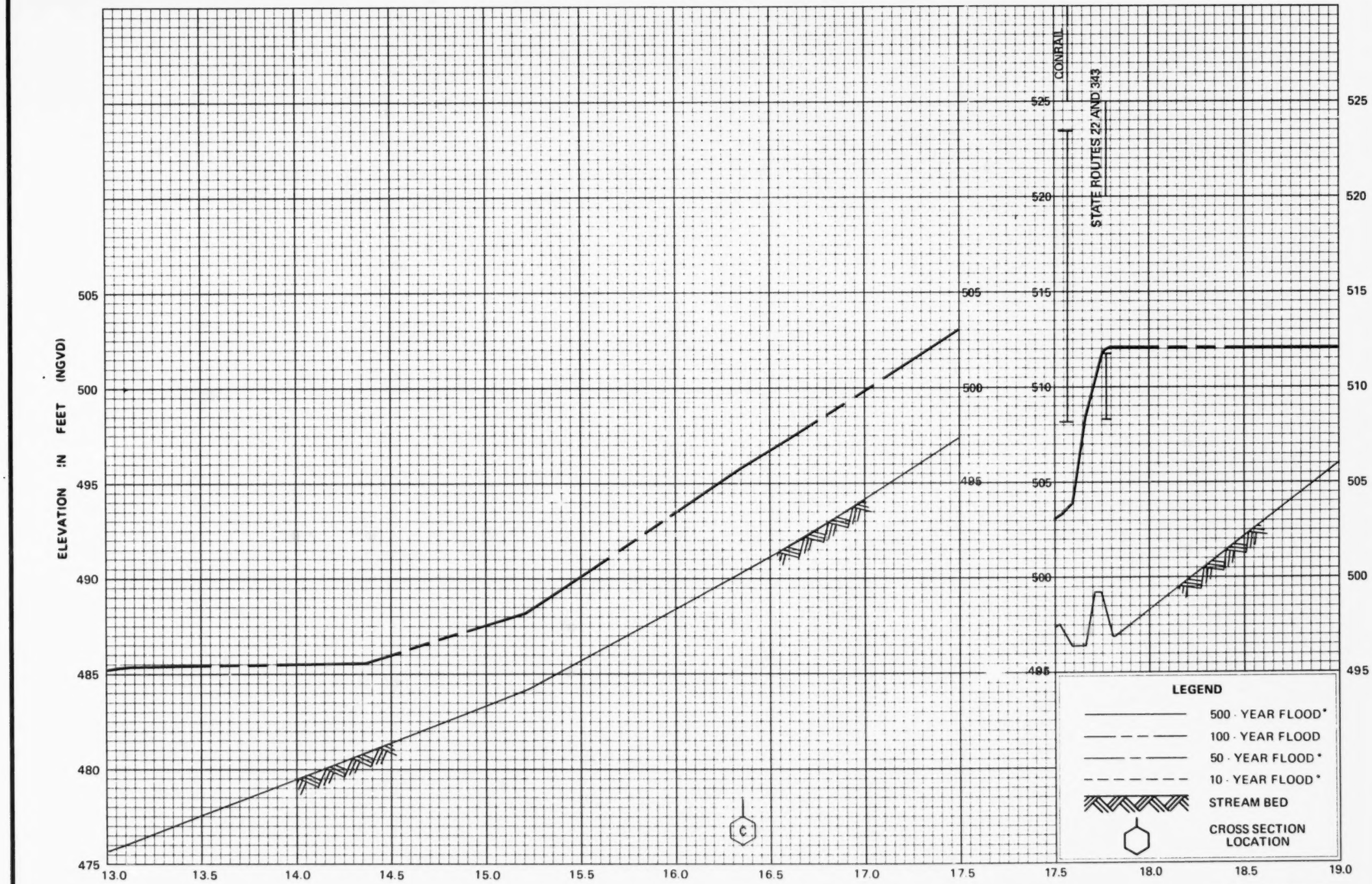
FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF AMENIA, NY
(DUTCHESS COUNTY)

12P

135365

A & E INC. BALTIMORE



FLOOD PROFILES

AMENIA STREAM

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF AMENIA, NY
(DUTCHESS COUNTY)

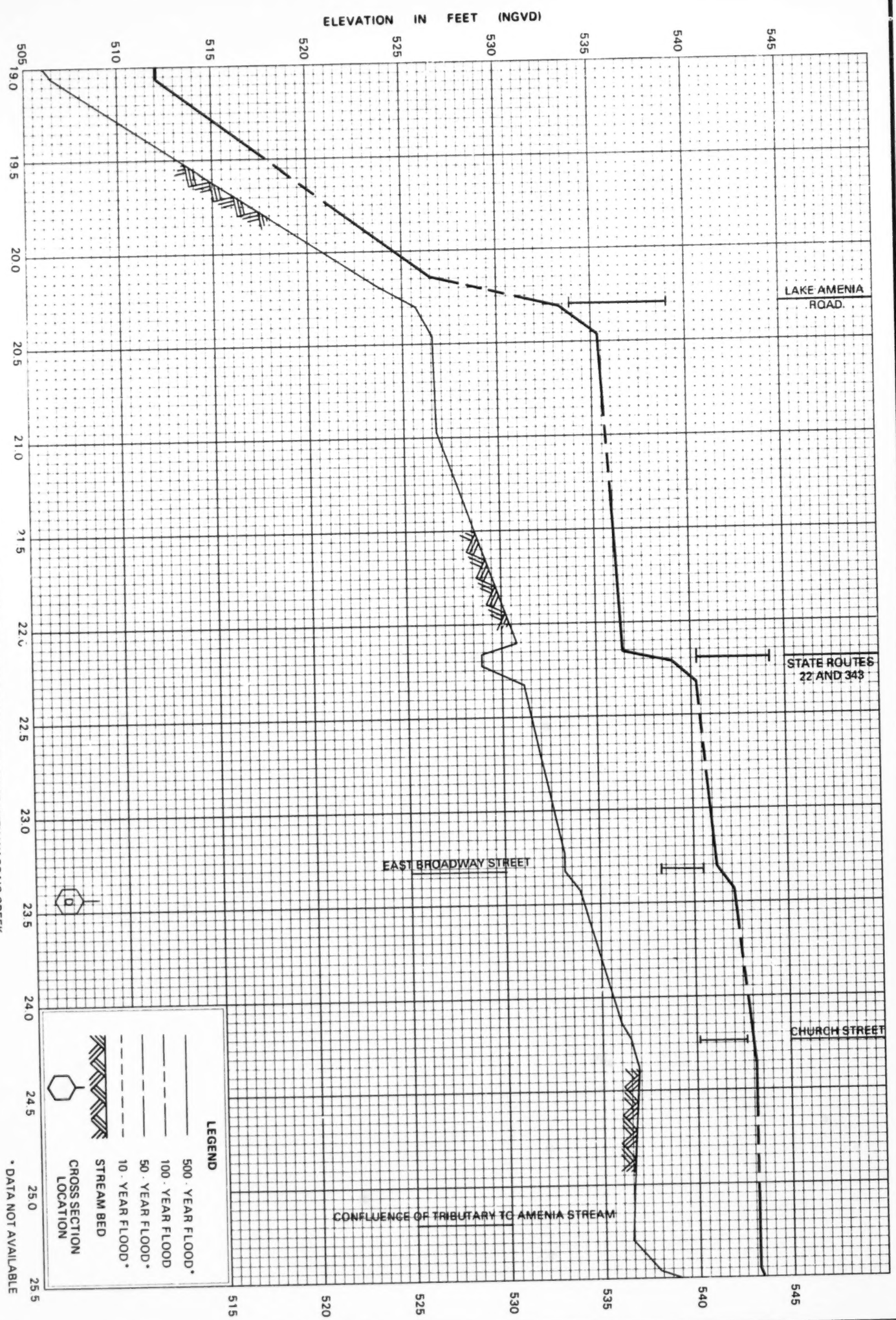
13P

135365

A & E INC. BALTIMORE

135365

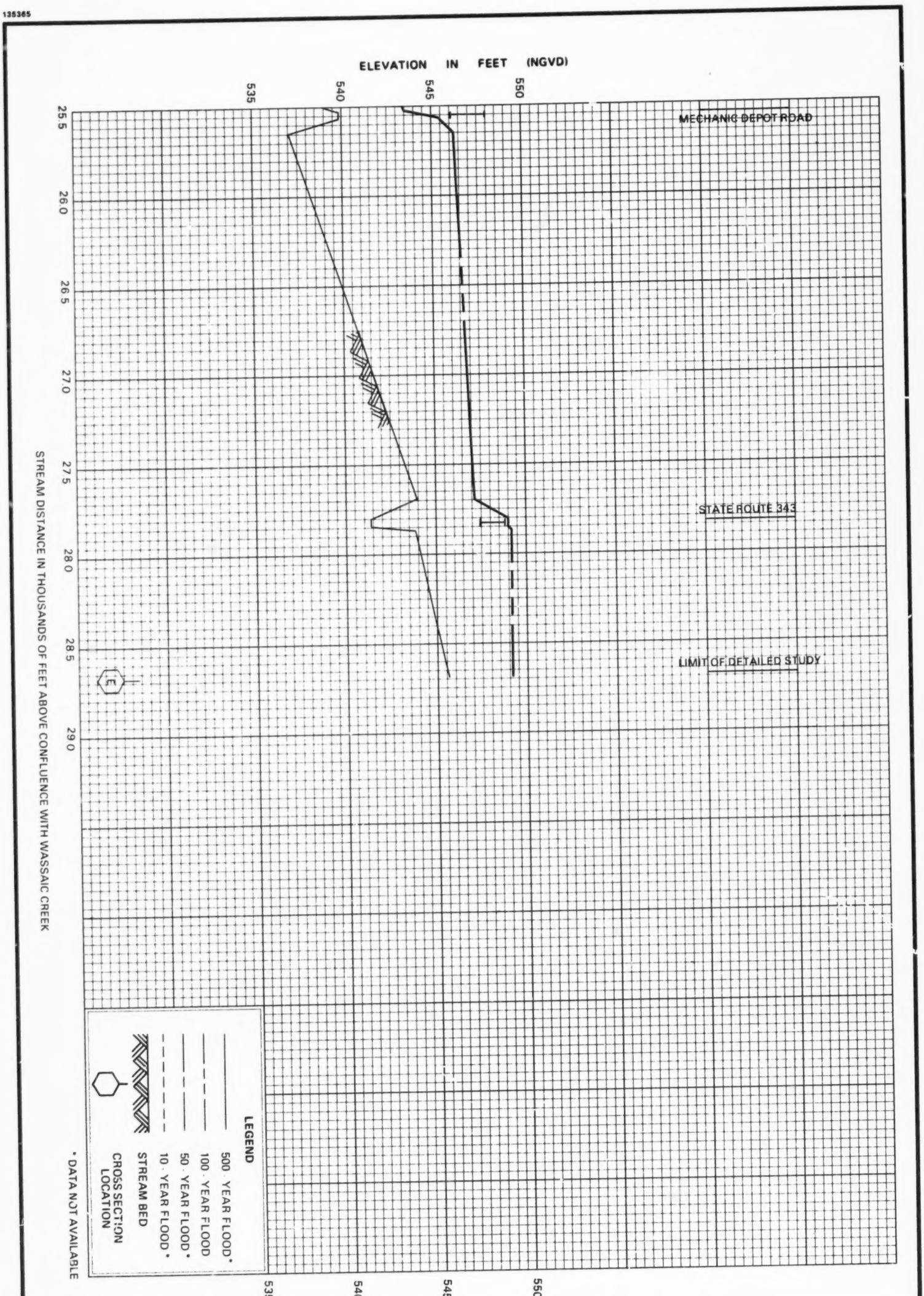
A & E INC. BALTIMORE



32

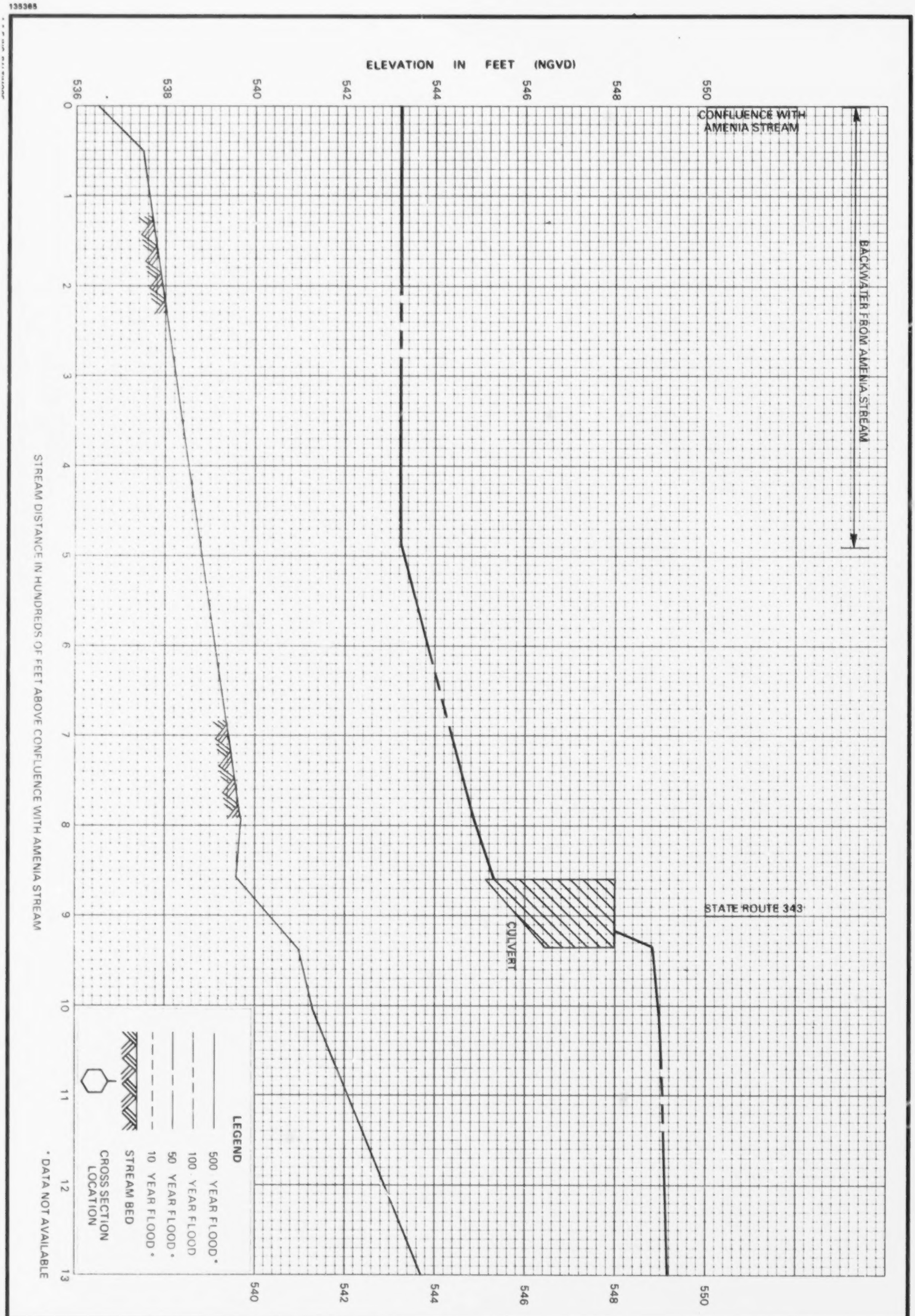
14P	FEDERAL EMERGENCY MANAGEMENT AGENCY **TOWN OF AMENIA, NY** (DUTCHESS COUNTY)	**FLOOD PROFILES** **AMENIA STREAM**

135365



33

15P	FEDERAL EMERGENCY MANAGEMENT AGENCY **TOWN OF AMENIA, NY** (DUTCHESS COUNTY)	**FLOOD PROFILES** **AMENIA STREAM**



16P

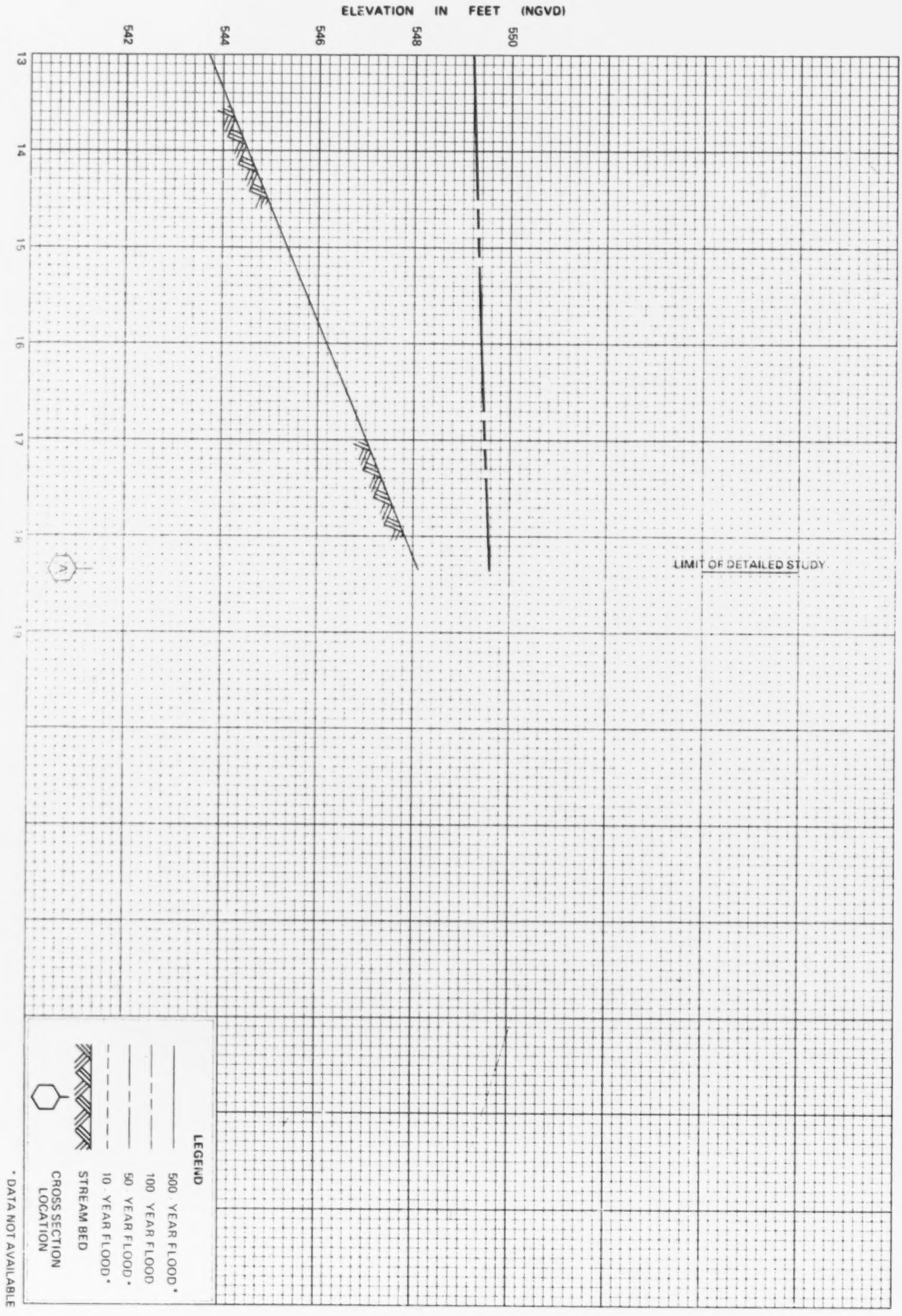
FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF AMENIA, NY
(DUTCHESS COUNTY)

FLOOD PROFILES

TRIBUTARY TO AMENIA STREAM

135365



35

17P	FEDERAL EMERGENCY MANAGEMENT AGENCY **TOWN OF AMENIA, NY** (DUTCHESS COUNTY)	**FLOOD PROFILES** **TRIBUTARY TO AMENIA STREAM**